SECTION 620

PAVEMENT MARKING

620.1 Description. This work shall consist of furnishing, installing and removing temporary and permanent pavement marking.

620.2 Construction Requirements.

620.2.1 General.

620.2.1.1 All pavement marking shall be in accordance with the latest edition of the MUTCD.

620.2.1.2 All pavement marking shall be installed as shown on the plans unless otherwise directed by the engineer.

620.2.1.3 All pavement marking shall be uniform in appearance.

620.2.1.4 Longitudinal pavement marking shall not be placed on longitudinal joints.

620.2.1.5 Damage to pavement marking caused by the contractor's operations, including resurfacing of shoulders, shall be repaired or replaced at the contractor's expense.

620.2.2 Permanent Pavement Marking.

620.2.2.1 Permanent pavement marking, except edge lines, shall be in place no later than five days after final paving operations. If edge lines are specified, edge lines shall be in place no later than 15 days after final paving operations.

620.2.2.2 On roadways open to traffic, any pavement marking obliterated by milling, grinding or resurfacing operations, except edge lines, shall be replaced with permanent pavement marking material specified in the contract or temporary pavement marking in accordance with Sec 620.2.3, no later than the end of the same day. If edge lines are specified, edge lines shall be the type of pavement marking material specified in the contract and placed no later than 15 days after final paving operations for each construction season. Pavement marking shall be replaced in the same configuration as the previously existing pavement marking unless otherwise shown on the plans or directed by the engineer.

620.2.2.3 When installing permanent pavement marking, the contractor shall begin intermittent pavement marking, starting with the gap, immediately after the last existing intermittent pavement marking to maintain the specified cycle length along the entire length of the intermittent pavement marking line.

620.2.2.4 If the permanent pavement marking cannot be placed according to these specifications, and the road is to be opened to traffic with no permanent pavement marking in place, the contractor shall, at the direction of the engineer, place and maintain temporary pavement marking at the contractor's expense. The contractor shall remove temporary pavement marking and place the permanent pavement marking according to these specifications as approved by the engineer.

620.2.3 Temporary Pavement Marking.

620.2.3.1 In lieu of installing the permanent pavement marking material specified in the contract, the contractor may, at the contractor's expense, provide and maintain temporary pavement marking. The temporary pavement marking shall be removed immediately prior to the installation of the permanent pavement marking material specified in the contract. Should the contractor choose this option, no more than one mile (1.6 km) of roadway behind the operation shall remain unmarked. At the end of each day, the temporary pavement marking shall be installed so, when combined with existing pavement marking, the entire project is marked.

620.2.3.2 On multiple lane roadways, temporary pavement marking shall be installed as shown on the plans.

620.2.3.3 On multiple lane roadways with two way traffic and "no passing zone" marking, all yellow centerline marking shall be replaced with temporary raised pavement markers with yellow on both sides. White lane line marking on climbing or turn lanes shall be replaced with white/red raised pavement markers with white facing traffic. Temporary raised pavement markers shall be in accordance with Sec 620.70. Sign WO8-12, "No Center Stripe", shall be installed throughout the section where the striping has been obliterated at one-half mile (1 km) intervals and 150 feet (45 m) from side roads or as shown on the plans. These signs shall be displayed only where the striping has been obliterated and shall be removed or covered where final striping is complete.

620.2.3.4 On resurfacing projects, when the adjacent layer of resurfacing has not been placed and the existing centerline or lane line marking has been obliterated, the temporary marking shall be placed on the higher layer at the centerline of the roadway or lane. Any temporary pavement marking damaged, displaced or missing before the final pavement marking is placed shall be replaced by the contractor at the contractor's expense.

620.2.4 Inspection and Acceptance.

620.2.4.1 Initial Inspection. Permanent pavement marking will be inspected following installation. The engineer will measure the initial retroreflectivity a minimum of seven days after, and within 14 days of application. If traffic control is required as determined by the engineer, the contractor shall provide approved traffic control at the contractor's expense.

620.2.4.1.1 If the initial performance inspection discloses any permanent pavement marking, in whole or in part, which does not meet the acceptance requirements, the contractor shall at the contractor's expense, repair or replace such work to the satisfaction of the engineer within 30 days. If more than 50 percent of any lane line, centerline or edge line is required to be replaced, the pavement marking shall be replaced in accordance with this specification.

620.2.4.1.2 Upon completion of the initial performance inspection, and after satisfactory completion of any necessary corrections, the engineer will notify the contractor, in writing, of the date of acceptance and release the contractor from further performance responsibility.

620.2.4.2 Acceptance.

620.2.4.2.1 Retroreflectivity inspection will be performed by the engineer using a Mirolux 30 or approved 30 meter geometry retroreflectometer. The engineer will take a minimum of five individual readings at two locations evenly spaced per one mile (1.6 km) section of each line.

The engineer will average all readings for each color line to determine the retroreflectivity. Retroreflectivity acceptance requirements will be as follows:

Type of Material	**Color**	**Millicandelas/ft^2/footcandle Millicandelas/m^2/lux (Minimum Initial)**
Extruded Thermoplastic	White	300
	Yellow	225
Hot Spray Thermoplastic	White	300
	Yellow	225
Epoxy	White	300
	Yellow	225
Preformed Marking Tape	White	Per Manufacturer's Specifications
	Yellow	Per Manufacturer's Specifications
Paint	White	300
	Yellow	225

620.2.4.2.2 Initial visual inspection requirements shall be as follows:

(a) Lane lines shall be 90 percent by area of each individual dashed line segment.

(b) Crosswalks, stop lines, arrows and words shall be 90 percent by area of each individual line, symbol or letter.

(c) Centerlines, edge lines, gore markings and channelizing lines shall be 90 percent by area measured over any 10-foot (3 m) length of any individual line regardless of width.

(d) The project shall be measured in its entirety according to (a), (b) and (c) above, and the entire project shall be 95 percent intact.

620.3 Method of Measurement.

620.3.1 Measurement of pavement marking will be made as described in the following sections.

620.3.2 Measurement of "No Center Stripe" signs will be made to the nearest square foot (0.1 square meter).

620.4 Basis of Payment.

620.4.1 The accepted quantity of pavement marking will be paid for at the contract unit price for each of the pay items included in the contract. Payment will be considered full compensation for all labor, equipment and material to complete the described work.

620.4.2 Payment for installing, maintaining, covering and removing "No Center Stripe" signs will be made at the contract unit price.

SECTION 620.10 PREFORMED PAVEMENT MARKING TAPE

620.10.1 Description. This work shall consist of furnishing and placing Type 1 preformed pavement marking tape at locations shown on the plans or as directed by the engineer. On bituminous surfaces, the contractor may use thermoplastic pavement marking material in lieu of Type 1 preformed marking tape at the Type 1 preformed marking tape contract unit price.

620.10.2 Material. All material shall be in accordance with Division 1000, Materials Details, and specifically as follows:

Item	Section
Type 1 Preformed Marking Tape	1048.2

620.10.3 Construction Requirements.

620.10.3.1 Type 1 preformed pavement marking tape shall be installed as shown on the plans, or as directed by the engineer. Type 1 preformed pavement marking tape shall be installed according to the manufacturer's specifications.

620.10.3.1.1 Arrows, words and symbols shall be white and may be formed from one piece or multiple pieces of Type 1 preformed pavement marking tape material.

620.10.3.1.2 On bituminous surfaces, Type 1 tape shall be embedded or inlaid by the final roller or other roller as approved by the tape manufacturer. All rolling shall be completed prior to the surface temperature decreasing to 120 F (50 C).

620.10.3.2 Method of Measurement.

620.10.3.2.1 Measurement of 4-inch (100 mm), 6-inch (150 mm), 8-inch (200 mm) and 24-inch (600 mm) preformed marking tape will be made to the nearest linear foot (0.5 m). Where intermittent lines are specified, deductions will be made for the gaps in pavement marking.

620.10.3.2.2 Measurement of preformed marking tape arrows, words and symbols will be made per each.

620.10.3.2.3 Final measurement will not be made except for authorized changes during construction or where appreciable errors are found in the contract quantity. The revision or correction will be computed and added to or deducted from the contract quantity.

620.10.3.3 Basis of Payment. The accepted quantity of preformed pavement marking tape will be paid for at the contract unit price for each of the pay items included in the contract. Payment will be considered full compensation for all labor, equipment and material to complete the described work.

SECTION 620.20 EXTRUDED THERMOPLASTIC PAVEMENT MARKING

620.20.1 Description. This work shall consist of furnishing and placing extruded thermoplastic pavement marking material and drop-on glass beads at locations shown on the plans or as directed by the engineer. Extruded thermoplastic pavement marking shall be used only on bituminous surfaces.

620.20.2 Material. All material shall be in accordance with Division 1000, Materials Details, and specifically as follows:

Item	Section
Extruded Thermoplastic Marking Material	1048.3
Drop-On Glass Beads	1048.6

620.20.3 Construction Requirements.

620.20.3.1 Equipment. All equipment for application of thermoplastic marking material shall be of such design and maintained in such condition as to properly heat, mix and apply the material.

620.20.3.1.1 Melting Kettle. The melting kettle shall be capable of heating the thermoplastic material to its recommended application temperature without scorching and shall be capable of maintaining the application temperature. The heating kettle shall have a heat transfer medium and the flame shall not come in direct contact with the material container surface. A temperature gauge shall be visible on the outside of the kettle to indicate the temperature of the thermoplastic material. The melting kettle shall have a continuous mixer or agitator capable of thoroughly mixing the material at such a rate as to maintain homogeneity of material and uniformity of temperature throughout.

620.20.3.1.2 Extruded Thermoplastic Dispensing Devices. Extrusion dispensing devices shall be capable of applying molten thermoplastic material in lines from 4 inches to 12 inches (100 mm to 300 mm) wide and 125 mils (3 mm) thick at the temperature recommended by the manufacturer of the thermoplastic material. Dispensing devices shall be of the extrusion type. The extrusion device shall have a visible temperature gauge to allow monitoring of the temperature of the thermoplastic material near the point of application.

620.20.3.1.3 Glass Bead Dispenser. All thermoplastic dispensers shall be equipped with a drop-on type glass bead dispenser. The glass bead dispenser shall be located so as to drop the glass beads immediately after the molten thermoplastic material is applied. The glass bead dispenser shall be adjustable to regulate flow of the beads and shall uniformly dispense the glass beads over the entire width of the line.

620.20.3.2 Surface Preparation. The pavement surface on which the thermoplastic material is to be placed shall be clean and dry. Even if the pavement is visibly dry, subsurface moisture may be present in amounts sufficient to affect bonding. If bonding is decreased due to excess moisture, marking operations shall cease until the pavement dries. Applied markings shall have no more than five percent by area of holes, voids or blisters. Pavement surfaces shall be inspected for cleanliness and any dirt, debris or other contaminants on the surface to be marked shall be removed. Existing pavement marking, including temporary pavement marking, that would prevent a mechanical bond between the thermoplastic and the pavement shall be removed by methods approved by the engineer.

620.20.3.3 Weather Limitations. The pavement surface where the thermoplastic material is to be placed shall have a minimum temperature of 60 F (15 C). The air temperature shall be at least 55 F (13 C) and rising during marking operations. The wind chill temperature shall be at least 45 F (7 C) and rising during marking operations. The pavement surface temperature, air temperature and wind chill temperature shall be determined before the start of each day of marking operation and at any other time deemed necessary by the engineer. Temperatures shall be obtained in accordance with MoDOT Test Method T20.

620.20.3.4 Primer Application. Primer will not be required on new bituminous surfaces unless recommended by the manufacturer of the thermoplastic material. A new bituminous surface will be defined as a surface that is less than 2 months old. If primer is recommended, the primer shall be applied and cured in accordance with the recommendations of the manufacturer of the thermoplastic material.

620.20.3.5 Thermoplastic Application. The thermoplastic marking material shall be extruded onto the pavement surface.

620.20.3.5.1 Thermoplastic marking material for use on new bituminous surfaces shall be alkyd thermoplastic. Material for use on other bituminous surfaces may be alkyd or hydrocarbon thermoplastic.

620.20.3.5.2 The temperature of the thermoplastic at the time of application shall be 400 to 425 F (204 to 218 C) for alkyd or hydrocarbon material. The temperature of the thermoplastic material shall be checked at the point of application with a calibrated thermometer at the beginning of each day's marking, after material is added to the dispensing device, after delays in the marking operation and when requested by the engineer. Discoloration of material will be cause for rejection.

620.20.3.5.3 Alkyd or hydrocarbon thermoplastic material shall not be heated above 450 F (232 C). Only the quantity of thermoplastic that can be used within 4 hours shall be heated. In no case shall any thermoplastic material be heated for more than 4 hours at the maximum application temperature, including initial heating. No material shall be reheated more than two times. Material subjected to these conditions will be rejected.

620.20.3.5.4 Finished marking shall have well-defined edges, and lateral deviation shall not exceed one inch in 100 feet (25 mm in 30 m). The thickness of long line thermoplastic markings shall be 100 ± 10 mils (2.5 ± 0.3 mm). The thickness of thermoplastic pavement marking arrows, words, symbols and other intersection markings, excluding lines, shall be a minimum of 125 mils (3 mm) and a maximum of 188 mils (5 mm). To determine acceptance, the thickness of the marking will be measured above the pavement surface at random points as selected by the engineer.

(a) If the thickness at a given location is less than 90 mils (2.2 mm), additional measurements will be taken on each side of the location by the engineer to determine the extent of the unacceptable portion of the marking. If the average thickness of the unacceptable portion is less than 90 mils (2.2 mm) but more than 60 mils (1.5 mm), an adjusted unit price of 50 percent of the contract unit price will be used in computing payment for the unacceptable area.

(b) If the measurements show the average thickness to be less than 60 mils (1.5 mm), the contractor shall grind the surface of the unacceptable portions of the markings to reduce the average thickness to approximately 50 mils (1.25 mm) or less. The contractor shall then apply additional thermoplastic material and beads to bring the thickness of the markings to a minimum of 90 mils (2.2 mm) and the retroreflectivity to the minimum required values. Corrections will be at the contractor's expense.

620.20.3.6 Glass Bead Application. The drop-on glass beads shall be mechanically deposited on the molten thermoplastic line immediately after placement of the thermoplastic at the rate of at least 12 pounds per 100 square feet (0.6 kg/m^2) of line. The glass beads shall not be dropped at the point of application of the thermoplastic or ahead of that point. Beads shall adhere to the cured thermoplastic or all marking operations shall cease until corrections are made.

620.20.3.7 Quality of Work. The applied thermoplastic marking shall be inspected continually for overall quality. Markings shall have clean cut edges and the finished yellow color shall be defined by Federal Test Standard 595 - Color Chip Number 13538 using Federal Test Standard 141 (Method 4252). Glass beads shall appear uniform on the entire marking surface. Adhesion to the pavement surface shall be checked with a stiff putty knife or similar instrument. The marking shall not be removable from a concrete surface. If the marking can be removed from the bituminous surface, residue of the bituminous substrate shall adhere to the marking material. If the thermoplastic marking does not provide initial nighttime

reflectivity or have the required color, the contractor shall, grind the surface and apply additional thermoplastic material and beads in accordance with Sec 620.3.5.4(b).

620.20.3.8 Method of Measurement. Measurement of 4-inch (100 mm), 6-inch (150 mm), 8-inch (200 mm) and 24-inch (600 mm) extruded thermoplastic pavement marking will be made in accordance with Sec 620.10.3.2.

620.20.3.9 Basis of Payment. The accepted quantity of extruded thermoplastic pavement marking will be paid for at the contract unit price for each of the pay items included in the contract. Payment will be considered full compensation for all labor, equipment and material to complete the described work.

620.30 PREFORMED REMOVABLE PAVEMENT MARKING TAPE

620.30.1 Description. This work shall consist of furnishing and placing preformed removable marking tape at locations shown on the plans or as directed by the engineer.

620.30.2 Material. All material shall be in accordance with Division 1000, Materials Details, and specifically as follows:

Item	Section
Preformed Removable Pavement Marking Tape	1048.4

620.30.3 Construction Requirements. All preformed removable pavement marking tape within the project limits shall be maintained by the contractor at the contractor's expense in a manner approved by the engineer. All preformed removable marking tape shall be installed according to the manufacturer's specifications.

620.30.4 Method of Measurement. Measurement of 4-inch (100 mm), 6-inch (150 mm), 8-inch (200 mm) and 24-inch (600 mm) preformed removable pavement marking tape will be made in accordance with Sec 620.10.3.2.

620.30.5 Basis of Payment. The accepted quantity of preformed removable pavement marking tape will be paid for at the contract unit price for each of the pay items included in the contract. Payment will be considered full compensation for all labor, equipment and material to complete the described work.

SECTION 620.40 PREFORMED SHORT TERM PAVEMENT MARKING TAPE

620.40.1 Description. This work shall consist of furnishing and placing preformed short term pavement marking tape at locations shown on the plans or as directed by the engineer. At the option of the contractor, pavement marking paint may be used in lieu of preformed short term pavement marking tape at the contractor's expense.

620.40.2 Material. All material shall be in accordance with Division 1000, Materials Details, and specifically as follows:

Item	Section
Preformed Short Term Pavement Marking Tape	1048.5

620.40.3 Construction Requirements.

620.40.3.1 Preformed short term marking tape shall be installed according to the manufacturer's specifications.

620.40.3.2 The centerline marking shall be yellow for a two-lane road with opposing traffic and the lane lines shall be white for a two-lane road with one way traffic. Preformed short term pavement marking tape shall be applied in increments 4 feet (1.2 m) long parallel to the direction of traffic flow at approximately 40-foot (12 m) intervals.

620.40.3.3 The centerline marking of pavement of sufficient width to accommodate four or more undivided lanes carrying opposing traffic shall be marked with two parallel yellow lines separated by a 4-inch (100 mm) space. Lane lines for these pavements shall be white in increments 4 feet (1.2 m) long at approximately 40-foot (12 m) intervals.

620.40.4 Method of Measurement. Measurement of preformed short term pavement marking tape will be made in accordance with Sec 620.10.3.2.

620.40.5 Basis of Payment. The accepted quantity of preformed short term pavement marking tape will be paid for at the contract unit price for each of the pay items included in the contract. Payment will be considered full compensation for all labor, equipment and material to complete the described work.

SECTION 620.50 PAINT FOR PAVEMENT MARKING

620.50.1 Description. This work shall consist of furnishing and placing pavement marking paint and drop-on glass beads at locations shown on the plans or as directed by the engineer. When paint is specified, the contractor may use either waterborne or acrylic copolymer pavement marking paint at the contract unit price, in accordance with this specification and with approval from the engineer.

620.50.2 Material. Traffic paint shall be used as specified on the plans or as approved by the engineer. Glass beads shall be in accordance with Division 1000, Materials Details, and specifically as follows:

Item	Section
Drop-On Glass Beads	1048.6

620.50.3 Construction Requirements.

620.50.3.1 Equipment. All equipment for application of pavement marking paint shall be of such design and maintained in such condition to properly and evenly apply marking paint and drop-on glass beads.

620.50.3.2 Surface Preparation. The surface on which paint is to be placed shall be clean and dry. Paint shall not be applied in damp conditions or if there is any evidence of surface moisture on the pavement.

620.50.3.3 Temperature Limitations. The pavement surface temperature and air temperature shall be determined before the start of each day of marking operation and at any other time deemed necessary by the engineer. Temperatures shall be obtained in accordance with MoDOT Test Method T20.

620.50.3.3.1 For waterborne applications the pavement surface temperature and ambient air temperatures shall be above 50 F (10 C). Waterborne paint shall not be applied if the forecast conditions for the 8 hours immediately following final application include precipitation or temperatures below 50 F (10 C).

620.50.3.3.2 For acrylic copolymer applications, the pavement surface temperature and

ambient air temperature shall be above 35 F (2 C).

620.50.3.4 Paint Application.

620.50.3.4.1 Paint shall be machine applied using spray guns designed and adjusted to apply paint at required thickness and width. If there is any evidence of gun clogging, splattering or uneven paint distribution, painting operations shall cease until equipment is restored to proper operation.

620.50.3.4.2 Painting of stop lines, arrows, words and symbols may be applied by hand using paint spray equipment. Equipment shall be capable of applying paint evenly to the required thickness. Pre-cut templates to the dimensions shown on the plans shall be used for arrows, words and symbols.

620.50.3.4.3 Paint shall be applied to a minimum thickness of 15 mils (0.4 mm). At the request of the engineer, the wet film thickness of the applied paint shall be tested with a paint thickness gauge.

620.50.3.4.4 If necessary, paint may be heated to a maximum temperature of 150 F (65 C) for waterborne and 125 F (52 C) for acrylic copolymer before application.

620.50.3.4.5 Finished markings shall have well-defined edges and lateral deviation shall not exceed one inch in 100 feet (25 mm in 30 m).

620.50.3.5 Glass Bead Application. Drop-on glass beads shall be mechanically applied to the wet paint directly behind the paint spray guns. Glass beads shall be applied evenly at a minimum rate of 8 pounds per gallon (0.95 kg/L) of paint. For stop lines, arrows, words and symbols, glass beads may be applied by hand. Glass beads shall be applied evenly and completely cover the painted area. If beads do not embed properly in the paint, all marking operations shall cease until corrections are made.

620.50.3.6 Quality of Work. The applied marking paint shall be inspected continually for overall quality. The finished white color shall be free from tint, furnishing good opacity and visibility under both daylight and artificial light. The finished yellow color shall be defined by Federal Test Standard 595 - Color Chip Number 33538. The glass beads shall appear uniform on the entire marking surface. The cured paint shall properly adhere to the pavement surface. If the marking paint does not provide initial nighttime reflectivity or if the marking does not have the required minimum thickness or required color, the contractor shall, at the contractor's expense, re-apply the marking paint to the required thickness and shall meet all requirements as described above.

620.50.4 Method of Measurement. Measurement of 4-inch (100 mm), 6-inch (150 mm), 8-inch (200 mm) and 24-inch (600 mm) pavement marking paint will be made in accordance with Sec 620.10.3.2.

620.50.5 Basis of Payment. The accepted quantity of pavement marking paint will be paid for at the contract unit price for each of the pay items included in the contract. Payment will be considered full compensation for all labor, equipment and material to complete the described work.

SECTION 620.60 PAVEMENT MARKING REMOVAL

620.60.1 Description. This work shall consist of all necessary operations for removal of existing pavement markings, including the removal of painted lines, thermoplastic pavement

marking, epoxy pavement marking, preformed pavement marking tape or preformed removable pavement marking tape when no longer required.

620.60.2 Construction Requirements. Removal of all pavement markings within the project limits shall be as shown on the plans or as directed by the engineer. Pavement markings shall be completely removed to the satisfaction of the engineer with minimal damage to the pavement. No more than five percent of the existing line shall remain. The pavement surface shall not be left scarred with an image which might mislead traffic. Any excess damage or scarring of the pavement shall be repaired at the contractor's expense.

620.60.3 Method of Measurement.

620.60.3.1 Measurement for the removal of pavement markings will be made to the nearest linear foot (0.5 m). Where intermittent lines are specified or existing, deductions will be made for gaps in the removal. Measurement will not be made for removal of pavement marking within the limits of a bypass roadway or other roadway to be obliterated at the completion of the project.

620.60.3.2 Final measurement will not be made except for authorized changes during construction or where appreciable errors are found in the contract quantity. The revision or correction will be computed and added to or deducted from the contract quantity.

620.60.4 Basis of Payment. The accepted quantity of pavement marking removal will be paid for at the contract unit price for each of the pay items included in the contract. Payment will be considered full compensation for all labor, equipment and material to complete the described work.

SECTION 620.70 TEMPORARY RAISED PAVEMENT MARKERS

620.70.1 Description. This work shall consist of installing and maintaining reflectorized temporary raised pavement markers (RPM's) on roadway lane lines, centerlines or edge lines as shown on the plans or as directed by the engineer.

620.70.2 Material. All material shall be in accordance with Division 1000, Materials Details, and specifically as follows:

Item	Section
Temporary Raised Pavement Markers	1048.7

620.70.3 Construction Requirements.

620.70.3.1 Temporary RPM's shall be of the colors shown on the plans unless otherwise directed by the engineer. Reflective faces shall be oriented to face traffic. Temporary RPM's shall be installed according to the manufacturer's specifications.

620.70.3.1.1 Type 1 Temporary RPM's shall be used for surface treatment projects when temporary RPM's are specified.

620.70.3.1.2 Type 2 Temporary RPM's shall be used on all projects other than surface treatment projects when temporary RPM's are specified.

620.70.3.2 Temporary RPM's shall be placed at approximately 40-foot (12 m) intervals.

620.70.3.3 On resurfacing projects, temporary RPM's shall be removed on intermediate lifts of asphalt before additional lifts are laid above them. Temporary RPM's on final wearing surfaces shall be removed if specified on the plans or as directed by the engineer. No direct payment will be made for the removal of temporary RPM's.

620.70.4 Method of Measurement.

620.70.4.1 Measurement of temporary raised pavement markers will be made per each.

620.70.4.2 Final measurement will not be made except for authorized changes during construction or where appreciable errors are found in the contract quantity. The revision or correction will be computed and added to or deducted from the contract quantity.

620.70.5 Basis of Payment. The accepted quantity of temporary RPM's will be paid for at the contract unit price for each of the pay items included in the contract. Payment will be considered full compensation for all labor, equipment and material to complete the described work.

620.80 HOT SPRAY THERMOPLASTIC PAVEMENT MARKING

620.80.1 Description. This work shall consist of furnishing and placing thermoplastic pavement marking material formulated with alkyd resin and intermix beads, and applied by the hot spray process at a 45-mil (1.15 mm) or 60-mil (1.50 mm) thickness as specified on the plans or as directed by the engineer. Hot spray thermoplastic pavement marking shall be used only on bituminous surfaces.

620.80.2 Material. All material shall be in accordance with Division 1000, Materials Details, and specifically as follows:

Item	Section
Hot Spray Thermoplastic Marking Material	1048.8
Drop-On Glass Beads	1048.6

620.80.3 Construction Requirements. Construction requirements shall be in accordance with Sec 620.20.3, except as follows.

620.80.3.1 Hot Spray Thermoplastic Dispensing Devices. The equipment shall be capable of applying molten thermoplastic material at the temperature recommended by the manufacturer of the thermoplastic material in lines from 4 inches (100 mm) to 12 inches (300 mm) wide at the specified thickness. Dispensing devices shall be of the spray type.

620.80.3.2 Thermoplastic Application. The thermoplastic marking material shall be sprayed onto the pavement surface.

620.80.3.2.1 The temperature of the thermoplastic material at the time of application shall be a minimum of 350 F (177 C) and a maximum of 425 F (218 C). The temperature of the thermoplastic material shall be checked at the point of application with a calibrated thermometer at the beginning of each day's marking, after material is added to the dispensing device, after delays in the marking operation, and any time deemed necessary by the engineer.

620.80.3.2.2 Discoloration of material will be cause for rejection.

620.80.3.2.3 Alkyd thermoplastic material shall not be heated above 450 F (232 C). Only the quantity of thermoplastic that can be used within 4 hours shall be heated. In no case shall any thermoplastic material be heated for more than 4 hours at the maximum application

temperature, including initial heating. No material shall be reheated more than two times. Material subjected to these conditions will be rejected.

620.80.3.2.4 Finished markings shall have well-defined edges and lateral deviation shall not exceed one inch in 100 feet (25 mm in 30 m). The thickness of the thermoplastic marking shall be within ± 5 mils (± 120 µm) of the specified thickness. The thickness of the marking will be measured above the pavement surface at random points selected by the engineer to determine acceptance.

(a) If the thickness at a given location is less than the thickness specified in the contract, additional measurements will be taken on each side of the location by the engineer to determine the extent of the unacceptable portion of the marking. If the average thickness of the unacceptable portion is less than the contract mil (mm) thickness, but no more than 15 mils (0.375 mm) less than the contract mil (mm) thickness, an adjusted unit price of 50 percent of the contract unit price will be used in computing payment for the unacceptable area.

(b) If the measurements show the average thickness to be more than 15 mils (0.375 mm) less than the contract mil (mm) thickness, the contractor shall grind the surface of the unacceptable portions of the markings to reduce the average thickness to approximately 20 mils (0.50 mm) less than the contract mil (mm) thickness. The contractor shall then apply additional thermoplastic material and beads to bring the thickness of the markings to a minimum of the contract mil (mm) thickness and the retroreflectivity to the minimum required values. Corrections will be at the contractor's expense.

620.80.4 Method of Measurement. Measurement of hot spray thermoplastic pavement marking will be made in accordance with Sec 620.10.3.2.

620.80.5 Basis of Payment. The accepted quantity of hot spray thermoplastic pavement marking will be paid for at the contract unit price for each of the pay items included in the contract. Payment will be considered full compensation for all labor, equipment and material to complete the described work.